

Ministry of Water Resources and Irrigation
US Agency for International Development
Agricultural Policy Reform Program
Environmental Policy and Institutional Strengthening Indefinite Quantity Contract

**APRP—Water Policy Activity
Contract PCE-1-00-96-00002-00
Task Order 807**

IRRIGATION MANAGEMENT TRANSFER:

***FRAMEWORK FOR
MONITORING AND EVALUATION***

Report No. 59

July 2002

Water Policy Program

International Resources Group

Winrock International

Nile Consultants

Report No. 59

IRRIGATION MANAGEMENT TRANSFER:

***FRAMEWORK FOR
MONITORING AND EVALUATION***

Prepared by
the IMT M&E Working Group:

Eng. Mohamed Nasser Ezzat (WPAU)
Eng. M. Abdel Rahman Shalaby (Consultant)
Eng. Essam Barakat (Irrigation Advisory Service)
Dr. Mahmoud Moustafa (National Water Research Center)
Eng. Md. Ali Khalil (Mechanical & Electrical Department)
Eng. Amira el Diasty (WPAU)
Eng. Moamen el Sharkawy (WPAU)
Dr. Robert Cardinalli (EPIQ IMT Task Manager)

July 2002
For
United States Agency for International Development/Egypt

Environmental Policy and Institutional Strengthening Indefinite Quantity Contract (EPIQ)
Partners: International Resources Group, Winrock International,
and Harvard Institute for International Development
Subcontractors: PADCO; Management Systems International; and Development Alternatives, Inc.

Collaborating Institutions: Center for Naval Analysis Corporation; Conservation International; KNB Engineering and Applied
Sciences, Inc.; Keller-Bliesner Engineering; Resource Management International, Inc.;
Tellus Institute; Urban Institute; and World Resources Institute

ACKNOWLEDGEMENTS

This study report was prepared by the MWRI/EPIQ Irrigation Management Transfer Working Group. Members of the group included Dr. Robert Cardinalli (IMT Task Manager), Eng. Mohamed Nasser Ezzat (WPAU Consultant), Eng. M. Abd-El Rahman Shalaby (MWRI Consultant), Eng. Essam Barakat (Irrigation Advisory Service), Dr. Mahmoud Moustafa (NWRC), Eng. Ali Khalil (Mechanical & Electrical Department), Eng. Moamen el Sharkawy (WPAU), and Eng. Amira el Diasty (WPAU).

The EPIQ Water Policy Reform Program (WPRP) is a joint activity of the Ministry of Water Resources and Irrigation and the United States Agency for International Development. It is carried out under the auspices of the Agricultural Policy Reform Program. Program implementation is the responsibility of Winrock International, International Resources Group, Ltd., and Nile Consultants.

In particular, the EPIQ/WPRP Chief of Party, the IMT Task Manager Dr. Robert Cardinalli, and working group members, would like to acknowledge the contributions and support of the many senior officials of MWRI, including policy and technical guidance provided by the following individuals was significant and is greatly appreciated: Eng. Gamil Mahmoud, chairman of the MWRI Steering Committee on IMT and the MWRI Water Policy Advisory Unit; Dr. Ross Hagan and Dr. Wadie Fahim Mankarious of USAID.

TABLE OF CONTENTS

Executive Summary	i
1. Introduction.....	1
1.1 Overview	1
1.2 Background	3
1.3 Necessity to Monitor IMT Outcomes and Impacts	4
1.4 Description of IMT Monitoring & Evaluations	6
2. Structure of IMT Monitoring and Evaluation System	7
2.1 General IMT M&E Framework	7
2.2 Stakeholders and Potential Key Intersects.....	9
2.3 Indict Stakeholders Potential Key Interests.....	9
2.4 Utilization of Information	10
2.5 M&E Performance Indicators	11
2.5.1 Process Issues	11
2.5.2 Outcome Issues	11
2.5.3 Impact Issues	11
2.6 System Performance Indicators.....	11
2.6.1 Process Issues	11
2.6.2 Outcome Issues	12
2.6.3 Impact Issues	14
2.7 Indicators on Changes in Costs of Irrigation / Drainage System Maintenance	15
2.7.1 Process Issues	15
2.7.2 Outcome Issues	15
2.7.3 Impact Issues	15
2.8 Indicators for Costs of Irrigation/Drainage System Operations.....	15
2.8.1 Process Issues	16
2.8.2 Outcome Issues	16
2.8.3 Impact Issues	16
2.9 Water Utilization/Water Saving Indicators.....	16
2.9.1 Process Issues	17

2.9.2	Outcome Issues	17
2.9.3	Impact Issues	17
2.10	Rural Economic Indicators	17
2.11	Industrial Economic Indicators	18
2.12	Environmental Indicators.....	18
2.12.1	Process Issues	18
2.12.2	Outcome Issues	18
2.12.3	Impact Issues	19
2.13	Organizational / Institutional Management Indicators	19
2.13.1	Process Issues	19
2.13.2	Outcome Issues	19
2.13.3	Impact Issues	19
2.14	Operations and Management Responsibility Performance indicators.....	20
2.14.1	Process Issues	20
2.14.2	Outcome Issues	20
2.14.3	Impact Issues	20
2.15	Capacity-Building Indicators	20
2.15.1	Process Issues	21
2.15.2	Outcome Issues	21
2.15.3	Impact Issues	21
2.16	Social Change Impact Indicators.....	21
3.	IMT M&E: Data Gathering, Analysis and Reporting	22
3.1	Process of Selecting the M&E	22
3.2	Methods for Data Collection and Analysis	22
3.2.1	Sampling.....	22
3.2.2	Data Collection	23
3.2.3	Data Analysis.....	23
3.3	Presenting M&E Results.....	23
3.4	Using Results of M&E	24
3.5	Methodological Tools for Gathering Information.....	24
3.5.1	Data Collection	25

3.5.1.1	Interviewing	25
3.5.1.2	Field Appraisal	25
3.5.1.3	Data Analysis	26
3.5.1.4	Intensive Monitoring for IMT Pilot Areas	26
4.	IMT M&E Staffing & Resource Configuration	27
4.1	Phase I	27
4.2	Phase II	27
4.3	Phase III	27
4.4	Staffing Requirements for Each Pilot Area	28
4.4.1	Phase I Staffing Requirements	28
4.4.2	Phase II Staffing Requirements	28
4.4.3	Phase III Staffing Requirements	28
4.4.4	MWRI Resources Required for IMT/Privation M&E System	29
5.	M&E Training Needs for MWRI Staff and BCWUAs	30
6.	Indicative Budgetary Requirements for Monitoring & Evaluation	31
6.1	Staff Salaries and Allowances	31
6.2	Training Requirements	31
6.2.1	For MWRI / M&E Staff	31
6.2.2	For BCWUA Members	31
6.2.3	Basic Requirement / Transport / Materials	32

Executive Summary

This report presents the results of the work carried out in completion of a study to develop a Monitoring & Evaluation (M&E) framework for the Irrigation Management Transfer (IMT) program in MWRI, and to be used as the basis for M&E components of other future water privatization efforts.

Irrigation Management Transfer is a policy benchmark achievement under the USAID/Government of Egypt Agricultural Policy Reform Program. As in the case of Egypt, governments around the world are attempting to reduce their recurring expenditures on irrigation and stabilize deterioration of scheme infrastructure without sacrificing the productivity of irrigated agriculture. The GOE transfer of major management responsibilities for sections of the irrigation system above the *mesqa*-level to stakeholders and/or the private sector is a bold advance toward the goal of participatory management and privatization of the irrigation system.

The primary features of the M&E framework were made available to the IMT Steering Committee members and other key officials of MWRI. To carry out the work of this activity, the IMT M&E Working Group was established, led by the EPIQ senior sociologist, and with members representing the Water Policy Advisory Unit and key units from the Irrigation Sector, National Water Research Center, Mechanical & Electrical Department, and Irrigation Advisory Service.

MWRI Policy: In a phased process of application, the MWRI will transfer selected sub-sections of Egypt's irrigation and drainage network to users and/or the private sector acting on behalf of the users.

The IMT policy objectives are to:

- Determine the prerequisites for introducing handing over of management responsibilities to stakeholders and/or the private sector in Egypt;
- Define the strategies and steps required to implement partial, incremental and total management transfer in all categories of land, including old lands. These are based on a phased transfer process beginning with a period of negotiated joint management prior to system hand-over; and
- Consider roles and responsibilities of MWRI in the transfer process, particularly in each of the various stages of transfer.

The IMT phased implementation plan includes the following elements:

- Legal changes required to support the IMT process, including contracting and assessment capabilities;
- Definition of roles and relationships between public and private sector entities as they relate to IMT;
- Definition of administrative and financial management systems for O&M;

- Training of staff and development of plans for organizational restructuring;
- Arrangement for provision of support services;
- Development of Branch Canal Water User Associations;
- Upgrading of the physical irrigation/drainage infrastructure as part of the transfer process.

In order to effectively determine the nature of performance and levels of impact, a system of Monitoring and Evaluation is required. This M&E system will also draw attention of implementers and policy makers to inherent problems, shortfalls and constraints that may develop as a particular program or sub-program is being implemented.

BCWUAs were formed by ministerial decree at the four IMT pilot areas.¹ An *IMT Baseline Socio-Economic Study* (EPIQ Report No. 47, Annex G) was carried out in the four IMT pilot areas prior to initiation of the BCWUA organizing process and before meetings with stakeholders in each area. The purpose of the *IMT Baseline Socio-Economic Study* was to describe, analyze, and explain farmers' agriculture behavior and provide a baseline data source that can be used to assess levels of program impact. This set of baseline data provides the basis for comparing results of implementation and impact assessment for the M&E system: the socio-demographic and economic characteristics of the respondents, patterns of land holdings, cropping structures, conditions of irrigation, farmers' views and attitudes toward irrigation issues, perceived abilities of the water users, the government, and the private sector to perform various maintenance functions, drainage issues, and the role of water users and the state in the management and maintenance of the irrigation network. Further baseline information related to farmers' practices and awareness can be found in the EPIQ Report No. 54, 2001 Knowledge, Attitudes & Practices of Egyptian Farmers Toward Water Resources.

It was agreed by the MWRI Steering Committee that MWRI must establish an IMT Monitoring and Evaluation System (MES), which will be particularly important at the time of IMT expansion. The MES will serve three primary functions: 1) track implementation efforts for problems and bottlenecks, 2) confirm and verify progress and achievements, and 3) provide the basis for assessing post-facto beneficiary impact.

This document highlights the need for a M&E program to be set in motion for the IMT effort, and indicates the roles the major MWRI units and other stakeholders will play in the process. Major areas for focus are *IMT process*, *IMT outcomes*, and *IMT impacts*. A distinction is drawn between **objective-driven M&E** and **participatory M&E**, and the importance of balancing complimentary use of techniques for each in order to emerge with the strongest analysis. The recommended structure for the M&E system parallels those developed in many countries for standard dynamic program interventions in terms of flexibility, maximization of resource inputs, and focused relevance.

It is the intent of this document to highlight a framework, structure, most appropriate indicators, and methods for the M&E data collection, analysis and reporting. The general stages of the IMT M&E process will be 1) selection of verification indicators for objectives/activities: outputs and impacts, 2) data collection and tabulation, 3) data aggregation and analysis, 4) presentation of

¹ El Nazl Canal (Sharqaiya), New El-Shabab Canal (Sharqaiya), Azeema Branch of Tahadi Canal (Beheira), and Beni Ebeid Canal (El Minya).

information and results, and 5) utilization of the M&E data to enhance the IMT implementation process. This document further elaborates on roles the IMT stakeholders would play in the M&E data collection, tabulation and presentation, identification of how the findings will be used, how based on information needs measurable indicators will be selected, and methods for data collections and analysis, through training, sampling, data collections practices, appraisals / analysis

It is recognized that the two major sets of stakeholders, i.e. the government (MWRI) and the private sector users and consumers, have key vested interests in the IMT results. These interests are categorized as: 1) infrastructure owner (MWRI or private sector) to preserve and/or increase value of infrastructure, 2) service providers to protect work opportunities, profits, & minimize complaints, 3) system financiers to maintain cost efficiencies commensurate with benefits, 4) water users' rights to define service & ensure performance standards, 5) consumers to minimize inflation in crop prices, 6) increase in agribusiness opportunities, incomes, & markets, 7) regulatory policy compliance, 8) minimization & containment of conflicts, 9) prevention of resource depletion and environmental degradation, and 10) users competing for resources to protect water, land, forests; & preserve quantity and quality of resources

Indicators for assessment and evaluation of IMT performance and impact are identified by subject matter for the following categories: 1) system performance indicators for surface irrigation, drainage, groundwater and mechanical/electrical issues, 2) indicators on changes in costs of irrigation and drainage system maintenance, 3) indicators for costs of irrigation and drainage system operations, 4) water utilization and water savings indicators, 5) rural economic indicators, 6) an industrial economic indicator, 7) indicators on environmental impact including water quality, 8) organization/institutional management indicators, 9) operations and management responsibility performance indicators, 10) indicators on capacity-building, and 11) social change impact indicators.

Although the M&E system is generalized to suit future privatization programming needs of MWRI, it has been specially tuned at this stage for the IMT pilot program. There is a particular need to undertake intensive regular M&E in the four pilot areas, as the results and lessons gleaned from the pilot effort will contribute to the design and configuration of replicated transfer/privatization programs in the future. Therefore, the resource needs and indicative budget included in this document, need to be given serious consideration by MWRI decision-makers.

List of Abbreviations and Acronyms

APRP	Agricultural Policy Reform Program
BCWUA	Branch Canal Water User Association
EPADP	(MWRI) Egyptian Public Authority for Drainage Projects
EPIQ	Environmental Policy and Institutional Strengthening Indefinite Quantity Contract
EWUP	Egypt Water Use Project
GOE	Government of Egypt
HEPS	(MWRI) Horizontal Expansion & Projects Sector
IAS	Irrigation Advisory Service
IDRC	International Development Research Council
IDS	Irrigation and Drainage System
IDSBA	Irrigation & Drainage System Beneficiary Association (equivalent to BCWUA)
IFAD	International Fund for Agricultural Development
IIP	Irrigation Improvement Project
IIS	(MWRI) Irrigation Improvement Sector
IMT	Irrigation Management Transfer
INPIM	International Network on Participatory Irrigation Management
IRG	International Resources Group, Ltd.
ISM	Irrigation Systems Management Project
MALR	Ministry of Agriculture and Land Reclamation
M&E	Monitoring and Evaluation
MED	(MWRI) Mechanical & Electrical Department
MWRI	Ministry of Water Resources and Irrigation
NWRC	(MWRI) National Water Research Center
O&M	Operations and Maintenance
PAC	Public Awareness Campaign
PRA	Participatory Rural Appraisal
USAID	United States Agency for International Development
WPAU	Water Policy Advisory Unit
WPRP	Water Resources Results Package
WUA	Water User Association

1. Introduction

1.1 Overview

The Ministry of Water Resources and Irrigation (MWRI) is the primary government agency charged with the management of water resources in Egypt. Escalating population growth, a desire for agricultural expansion, and increasing demands on surface water supply play significant roles in water delivery capability. Both MWRI and USAID are aware of the need to develop policy reform that will effectively address these and other issues that determine utilization efficiency, productivity, and protection of water resources.

During FY 96/97 the MWRI and USAID developed a “water resources results policy package” that focused on producing four major results:

- 1) improved irrigation policy assessment and planning process,
- 2) improved irrigation system management,
- 3) improved private sector participation in policy change, and
- 4) improved capacity to manage the policy process.

The MWRI and USAID designed the water resources results package with the following objectives:

- To increase MWRI’s ability to analyze and formulate strategies and policies related to integrated water supply augmentation, conservation and utilization, and protection of Nile water quality.
- To improve water allocation and distribution management policies for conservation of water while maintaining farm income.
- To recover the capital cost of *mesqa* improvements and establish a policy for the recovery of O&M costs of the main system.
- To increase users' involvement in system O&M.
- To introduce a decentralized planning and decision-making process at the irrigation district level.

In early 1997 the water resources results package was integrated into USAID’s Agricultural Policy Reform Program (APRP). APRP is a broad-based policy reform program involving five GOE ministries (MWRI, Ministry of Agriculture and Land Reclamation (MALR), Ministry of Trade and Supply, Ministry of Public Enterprise, and Ministry of International Cooperation). APRP has the goal of developing and implementing policy reform recommendations in support of private enterprise in agriculture and agribusiness.

USAID supports the MWRI in five program activities under APRP. These five activities are:

- 1) water policy analyses, 2) water policy advisory unit, 3) water education and communication, 4) main systems management, and 5) Nile River monitoring, forecasting and simulation. USAID supports the Ministry’s efforts through technical assistance and cash transfers (annual *tranches*) based on achievement of policy reform benchmarks.

Technical assistance for the water policy analyses is provided through a task order (Contract PCE-I-00-96-00002-00, Task Order 807) under the umbrella of the Environmental Policy and Institutional Strengthening Indefinite Quantity Contract (EPIQ) between USAID and a consortium headed by the International Resources Group, Ltd. (IRG) and Winrock International. Local technical assistance and administrative support is provided through a subcontract with Nile Consultants.

1.2 Background

As a result of major policy reform leading to water resource privatization, MWRI implementers are maintaining a focus on the essential principles as they apply to programs and initiatives leading to water resource privatization, e.g. Irrigation Management Transfer. The process of privatization creates a new form of local level organization, so monitoring and evaluation (M&E) will be important to assure that objective and timely information is made available about how IMT is being implemented, what outcomes are emerging, and eventually, what impacts are realized. Focused and well-implemented M&E will help reduce controversy and misunderstandings enough to permit consensus building about the path of water policy reforms such as IMT.

Irrigation Management Transfer (IMT) was defined by MWRI during Tranche IV (1999-2001) as the *turning over of authority and responsibility to manage irrigation systems from government agencies to water users* (BCWUA's) and the private sector. The key services to be transferred are water delivery and maintenance of irrigation and drainage infrastructure, although there may be other services desired after transfer, such as technical consultation, design and construction, information, extension, credit, marketing, etc. After IMT, water users will have the authority to define what services should be provided, what their objectives and targets should be, and what service performance standards are acceptable. To be effective, BCWUAs require the necessary rights and authority to implement these goals and standards (including authority to apply sanctions against rule breakers). These rights and authorities are being granted under the revised Government of Egypt legislative reforms affecting water issues.

Arranging irrigation services includes choosing service providers and collect whatever resources are required to implement the desired services. A WUA may choose to provide the services by themselves, they may continue to have a government agency provide some services (perhaps at the outlet or main canal level), or they may contract with a third party to provide some services. But the essential point is that full or comprehensive transfer of management includes transferring the authority to *define* and *arrange* irrigation services. Sometimes IMT is only partial, in that the government retains control over some aspects of defining, arranging, and implementing water management services. The government may retain control over final approval of the O&M plan, budget allocations, or complete management at higher hydraulic levels.

Preconceived plans often change during implementation and adjustments may need to be made based partly on what is learned through monitoring and evaluation. Monitoring of implementation is generally done to find out what is actually being done in the process, what works and what doesn't. The following questions are issues that commonly arise in the *process* of implementing IMT programs:

- What roles are the irrigation agency, WUAs, BCWUAs, and other organizations performing in implementation?
- How well are these organizations doing in their roles in the IMT program?
- What knowledge and skills are available for the different roles?
- What actions are being taken to organize water users associations?

- How much area or how many systems have been transferred?
- What is being done to restructure organizations in the irrigation sector? What problems are arising from this, if any?
- What is being done to develop transfer concessions, new irrigation service agreements, and work plans? What problems and lessons are emerging?
- What are the levels of new irrigation service fees and how are these being collected, accounted for and utilized?
- What is the process for rehabilitation or improvements in irrigation infrastructure? To what extent are farmers involved?
- Are infrastructure repairs compatible with the voice and preferences of water users? What is the quality of design and construction?

In some cases it may be desirable to monitor possible sources of threats or opportunities to IMT, such as changes in economic and agricultural policy, reforms in other sectors and local institutions, changes in the economy and markets, and environmental problems.

1.3 Necessity to Monitor IMT Outcomes and Impacts

Data collected to assess impacts and outcomes must be done efficiently. Data efficiency means that the minimum amount of information needed is collected, and no more. Data collection costs money and takes up valuable time of farmers and professionals. No data should be collected which is unnecessary, irrelevant or redundant. Overlap and unnecessary duplication should be avoided. Another way of achieving information efficiency is by combining some indicators into more complex indicators. For example, indicators about water delivery and crop yield can be combined to create an indicator of crop yield per unit of water.

As is the case for planning and implementation, M&E is also essential for ensuring that stakeholders learn about the immediate and eventual results of IMT as they unfold. Findings from M&E about controversial aspects may help overcome resistance. Or they may enable participants in reform to make corrections, or where necessary, make additional policy and organizational changes, before more serious problems arise. The following are examples of potential immediate *outcomes* of IMT that the government and/or water users tend to be concerned about:

- Financial viability of WUAs and BCWUAs
- Frequency of water disputes
- Functional condition of irrigation infrastructure
- Irrigation service fee levels and collection rates
- Level of investment in maintenance
- Popular awareness and support for WUA and BCWUA policies and decisions
- Popular support for WUA and BCWUA leaders
- Quality of the water delivery service (including efficiency, reliability and equity)

The following are examples of possible eventual *impacts* of IMT that tend to be priority concerns of stakeholders:

- Area irrigated
- Crop yields
- Cropping intensity
- Employment
- Farm income
- Farm income and agricultural labor wages
- Reduction of poverty
- Sustainability of area irrigated
- Water-logging and salinity in irrigable areas

IMT monitoring and evaluation is designed as a critical tool for analyzing performance of transfer of irrigation management from government to users. This is undertaken so that MWRI planners can better understand how the IMT program is being implemented at local levels and what are its results. It is emphasized throughout the document that this basic framework is applicable to any program in water resource privatization. It is done so that other stakeholders, such as farmers and local government officials, can know how the program is affecting them, so that reform can be a well-documented and transparent learning experience, and to make those responsible for implementing the IMT policy reform accountable to the basic principles of the reform.

In this IMT program the monitoring and evaluation framework distinguishes between inputs, process, outcomes and impacts of some intervention or reform program. *Inputs* can be policies, legislation, plans, financing, human resources and training activities. They are all resources that are mobilized to drive the IMT program. The implementation *process* is the series of actions and decisions that should be done in order to make the program happen and achieve the objectives and targets specified by reformers. *Outcomes* are the immediate or direct effects of an intervention. *Impacts* are the ultimate results of reforms or interventions.

Both monitoring and evaluation seek to answer the question, “How well are the IMT programs progressing?” But monitoring accepts existing objectives and targets as given and assesses to what extent these are being implemented and achieved. It focuses on implementation. If the results of monitoring are properly reviewed and incorporated into the on-going reform process, it should help MWRI to make improvements in planning and implementation. Evaluation focuses on determining whether or not the IMT program is producing the intended outcomes and impacts its MWRI anticipated. Findings from an evaluation can enable all the stakeholders to assess whether the IMT policy reform was appropriately designed and applied.

1.4 Description of IMT Monitoring & Evaluation

There are two basic types of monitoring and evaluation. These are *objective-driven M&E* and *participatory M&E*.

Objective-driven M&E is the most conventional, and in some ways, it is the simplest approach. It accepts the goals and objectives contained in official policy documents and translates these into specific indicators for M&E. The only indicators for implementation, outcomes and impacts that are included in the M&E are those specified by official policies and program plans. Goal-oriented M&E assumes a singular perspective and consistent set of goals. It is derived from the top-down administrative paradigm. Data is aggregated to the level of senior planners. It tends to be primarily quantitative, is relatively efficient and can be applied over a wide area. Its main weaknesses are that it tends to have blinders against detecting unexpected results.

Participatory M&E is based on the assumption that the values and interests of different stakeholders should be represented in M&E. In formulating an M&E system based on the multiple perspectives approach, planners identify the key concerns and interests of different stakeholders. The M&E system includes indicators that represent the concerns and interests of different stakeholders. It tracks progress and new developments according to these diverse perspectives. It tends to be more comprehensive than objective-driven M&E. And it tends to involve multiple methods and more opportunities for involvement of stakeholders in information gathering and review of results.

Participatory M&E may involve representatives of all key stakeholders as equal partners in the design, identification of indicators, implementation and analysis of results of an M&E system. Participatory rural appraisal (PRA) techniques such as group-structured interviewing, simple mapping, use of diagrams and graphic representations based on local materials, etc. are used to enable rural people to steer the process and identify their own priorities and interests. As an example of how PRA techniques were effectively utilized in MWRI, the reader is directed to peruse EPIQ Report 54, 2001 Knowledge, Attitudes & Practices of Egyptian Farmers Toward Water Resources. This participatory form of M&E has the potential to produce more in-depth understandings of local knowledge and circumstances, than does a uniform objective-driven approach. It has greater potential to discover the unexpected and the perceptions of local people, both service providers as well as users.

2 Structure of IMT Monitoring and Evaluation System

2.1 General IMT M&E Framework

The general M&E framework for the MWRI future privatization programs, including IMT, would encompass the standard procedures for assessing program performance and interventions to achieve the objectives. The privatization programs would be implemented through sets of activities / projects / services to achieve the specific objectives. Resources and inputs will be secured to carry out the activities to achieve the outputs/outcomes that impact on all target stakeholders during the short and long term.

The process will be monitored and evaluated through a cycle of 1) Planning, 2) Monitoring, 3) Evaluation, 4) Needs Assessment, in a repeating loop cycle. The *planning - evaluation* cycle will be carried out through sets of verification indicators or variables based on sources or means of measuring or comparing the achievements from quantitative and qualitative points of view or perspectives.

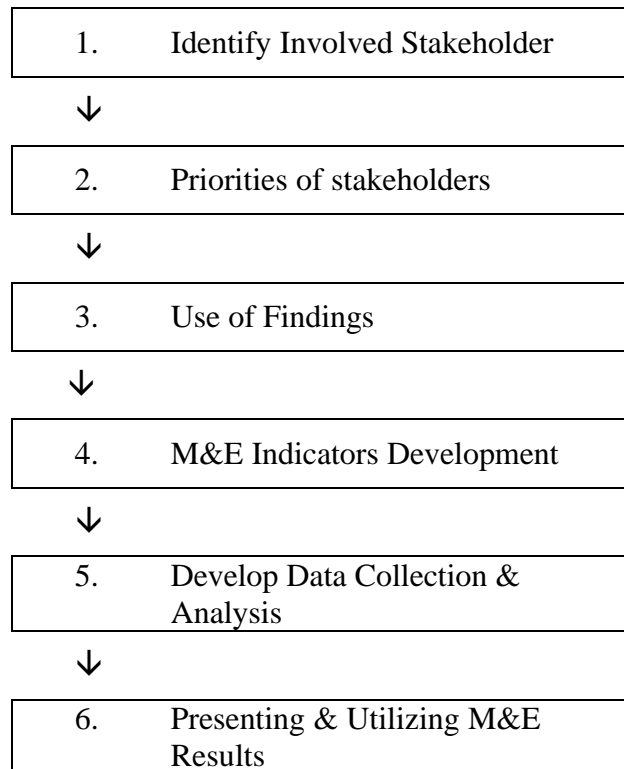
The general stages of the IMT M&E process will be:

- Selection of verification indicators for objectives/activities: outputs and impacts.
- Data collection and tabulation
- Data aggregation and analysis
- Presentation of information and results
- Utilization of the M&E data to enhance the IMT implementation process

To organize and implement the IMT M&E the following issues will need to be identified and developed:

- Roles the IMT stakeholders would play in the M&E data collection, tabulation and presentation
- Identification of the how findings will be used
- Based on information needs, measurable indicators will be selected
- Identify methods for data collections and analysis, through training, sampling, data collections practices, appraisals / analysis
- Presenting and utilizing data and results of IMT M&E, through different ways of presenting data (depending on particular stakeholder audience) and using results that would enhance the IMT objectives.

The framework of the general procedures for M&E is outlined in the figure:



Generally, identification and selection of verification indicators are derived from objectives and performance criteria. A list of objectives will lead to indicators, which will be verified, by sources of information and / or performance criteria. Tabular listing of objectives, indicators and performance criteria (see sample table below) will facilitate the process of data organization and analysis.

Objectives	Indicators	Performance criteria

Based on the data and information collected and analyzed, the evaluation of performance would compare the findings with the information contained in the baseline data or performance criteria. M&E indicators for assessing the process are of vital importance for shedding light on objectives / performance rate / quantity / quality of achievements and timely information regarding the

program implementation, outcomes and impacts. In general, functional issues, e.g. finance, O&M, transfer process and system impacts, socio-economic impacts, etc. will be considered in the framework of organizing and implementing the M&E program.

2.2 Stakeholders' Potential Key Interests

All stakeholders in the IMT process will have major interests in the M&E results and findings. Most of these interests are predicated on preserving the value of the irrigation system, maximizing opportunities for greater physical and economic efficiencies. These interests are categorized as follows:

- Infrastructure owner (MWRI or private sector): to preserve and/or increase value of infrastructure
- Service providers: to protect work opportunities, profits, & minimize complaints
- System financiers: to maintain cost efficiencies commensurate with benefits
- Water user rights: to define service & ensure performance standards

2.3 Stakeholder Potential Indirect Key Interests

A secondary set of interests are seen to impact indirectly on how the water management system functions. These are identified as agricultural production and resource management priority issues. Examples are as follows:

- Minimize inflation in crop price production
- Increase in agribusiness opportunities, incomes, & markets
- Regulatory policy compliance, minimization & containment of conflicts, prevention of resource depletion and environmental degradation
- Users competing for resources to protect water, land, forests; & preserve quantity and quality of resources

M&E data for the MWRI IMT program should accurately reflect the real interests and priorities of stakeholders (as indicated in sections 2.2 and 2.3), the real situation in the field, actual differences in performance, and the general changes that an indicator is supposed to measure. Internal validity is the extent to which an indicator really measures the broader thing it is intended to measure. For example, does the irrigation fee collection rate really measure willingness of farmers to pay for irrigation services? (Perhaps the services were not delivered.) Is the functional condition of irrigation structures really a good indicator of adequacy of maintenance or is it more an indication of faulty design and construction? Is economic value of agricultural production more an indicator of productivity of irrigated agriculture or only crop price levels?

A focus on indicators related to the farmer or water user, and irrigated agriculture is the norm. Corresponding changes that are supposed to be made in other organizations often are not part of

the M&E system. Such changes may include restructuring of the irrigation agency, retraining and redeployment of staff, changes in financing mechanisms and allocation of funds, taking on of new tasks such as environmental regulation. The process may likely include re-crafting or formation of new support services such as credit and finance, dispute resolution, extension, and marketing. Some of these aspects may not be included in M&E systems because they are sensitive to some government agencies.

2.4 Utilization of information

It is assumed that part of the process of formalizing an M&E system, even on a trial basis, will be to assure the presence of an accepted network of user or other transfer entities, and channels of communication and decision-making ready to receive and deliberate on the findings. Dialogue channels must exist between the IMT Steering Committee, the MWRI departments and directorates, and the transfer entities. These should have the authority to respond quickly to findings as needed. The results of the M&E process should be transparent to all relevant stakeholders, so that they can be used to make timely adjustments and enhancements when needed.

2.5 M&E Performance Indicators

It is very important that MWRI monitor and evaluate the implementation, direct outcomes and ultimate impacts of any privatization program, e.g. IMT program. Performance assessment can be divided into three components of reform: 1) assessment of the process of implementation, 2) assessment of immediate outcomes of implementation, and 3) assessment of ultimate impacts. Measuring outcomes and impacts of a reform program is vital so that it can be a learning process, which enables adjustments and improvements during implementation. Key issues for the MWRI reform program in water sector and related needs for M&E are discussed below.

Use of appropriate and revealing indicators is the backbone of the M&E system. In order to effectively utilize its limited resources MWRI must maximize its staffing and budget to the most essential M&E. There will be little opportunity for, or advantage gained from, an M&E system that lacks:

- a clear focus
- quickly and easily interpreted results
- a final outcome that “tells an accurate story” of what has taken place.

Selection of indicators must be carefully thought out and considered, weighing merits and disadvantages of each one, until the final list has been adopted.

In this section, the attention of the reader is drawn to sets of proposed indicators that are listed as potentially useful and viable. It is not the intent of this present study to finalize the list of

performance indicators, but to offer an array of those indicators that, at this stage of the IMT process, appear to be both relevant and appropriate.

The potential indicators offered in this document reflect the current thinking of the MWRI IMT Working Group members, and have been consensus-vetted through the members of the IMT Steering Committee.

Over the course of designing and preparing the final M&E system, the IMT implementers will need to pare down the list of potential indicators to a number that is reasonable, in view of resources available. Careful attention must be given to involving the transfer entities (e.g. BCWUAs) in the information collection and verification process.

It should be emphasized that in a number of instances, key indicators crosscut over more than one category. Examples would be indicators that measure impact on water savings as well as agricultural production yields. In such cases, the indicators have been reported in only one category.

2.5.1 Process Issues

Process issues are about the dynamics of change, procedures and achievement of specific targets. A process assessment attempts to understand if implementation is being undertaken appropriately. They tend to require more qualitative indicators than do outcome and impact assessments. In many cases multiple indicators for the same issue may be necessary to get a balanced view.

2.5.2 Outcome Issues

Outcome issues are about the immediate, direct effects of a reform program, or the achievement of essential objectives. An assessment of outcomes asks, “Are the stakeholders accomplishing their stated objectives?” Different BCWUAs and Irrigation and/or EPADP directorates may have different requirements for management activities and levels of intensity. It is important that not all agencies be evaluated according to the same standards. Hence, ratio-type indicators are recommended which incorporate local management requirements. Such indicators will have to be kept flexible according to specific local conditions.

2.5.3 Impact Issues

Impact issues are about the ultimate, indirect effects of a reform program, or the realization of the basic goals and purposes of the IMT program. If reforms are implemented as intended, it is important to then know whether they are having the intended ultimate effects on people and the environment. Normally, this takes longer to assess than outcomes. Impact assessment is more closely associated with evaluation than monitoring.

2.6 System Performance Indicators

(For Surface Irrigation, Drainage Sector, Groundwater Sector, and Mechanical/Electrical Issues)

2.6.1 Process Indicators

What changes in institutional arrangements or practical methods have been applied to achieve IMT results?

Modification to institutional structures as well as adoption of new practices will impact directly on IMT performance, and should be tracked by using quantifiable indicators, where possible. Suggested indicators are indicators:

- % improvement of the standard of services
- Annual or pre-season O&M planning process
- Control over intake, secondary and main canal system, and major structures
- Degree of GW exploration, drilling, pumping, storage, distribution, contamination control
- Degree of proper setting of irrigation schedule
- Extent of flood forecasting and early warning flood management systems and disaster relief
- Frequency of maintenance works
- Frequency of monitoring surface and groundwater quality
- Frequency of pump (main and booster pumps) and GW well breakdowns
- Gap between existing and desired condition of irrigation and drainage scheme infrastructure
- Gap between existing and desired levels of O&M performance
- Identifying areas and structures to be rehabilitated
- Increase level of cleanliness of irrigation & drainage systems
- No. of irrigations by crop and season
- Operational problems addressed promptly & adequately
- Reduction in maintenance frequency and time of irrigation & drainage systems groundwater wells and pumping stations
- Reduction in water logging and salinity problems
- Time taken to repair major breakdowns
- Total No. of official and non-official groundwater wells
- Volume of maintenance works completed
- Volume of rehabilitation works completed

2.6.2 Outcome Indicators

To what extent has there been a marked change in actual irrigated and drained areas since IMT was put into place?

It is likely difficult to immediately attribute increases in irrigated/drained area directly to the IMT process versus the rehabilitation work. Increases due to the IMT institutional reforms will

only become apparent after a few years after rehabilitation, or in comparison with schemes, which did not have rehabilitation (if there are any which are comparable to the others). Whichever definition for “area under irrigation” is used, it should be a clear and standard one that enables assessment of current performance of O&M. Any ambiguity in the definition will make it highly problematic to assess level of change.

After the above issues have been addressed, the following simple indicators could be used:

- Annual irrigation intensity
- Expansion in drained area
- Expansion of groundwater irrigated area
- Extent of working irrigation/drainage pumping stations
- Irrigated Area Utilization Efficiency = Actual area irrigated / current functional service area²
- Irrigation Potential Achievement Index = Actual area irrigated / potential area created
- Ratio between actual drainage area and planned drainage area
- Ratio between actual GW-based irrigation area and its planned irrigation area

Has there been an improvement in efficiency, equity, or reliability of water distribution after implementation of the reform program?

- % increase/decrease of pump stations and groundwater wells efficiencies³
- Degree to which the users find the irrigation and drainage systems “user-friendly” and responsive
- Delivery Performance Ratio (DPR) = Actual delivery / Target deliver (at different locations for a given area)
- Delivery Reliability Index = Total number of irrigations / Target number of irrigations (for selected head and tail areas)
- Field Application Efficiency = Crop water requirement / Amount of water delivered to field,
- Head/tail Equity Ratio = Average DPR of upper-end turnouts / Average DPR of lower-end turnouts
- Irrigation Distribution Efficiency = Amount delivered to turnouts / Total inflow to scheme
- Irrigation Scheme Efficiency = Crop water requirement / Total inflow to scheme
- Relative Irrigation Supply = Irrigation supply / Irrigation demand

Has there been an improvement in the quality of maintenance and functional condition of irrigation & drainage scheme structures after the reform program?

² Current functional service area means the area physically served by irrigation because irrigation structures exist and are functional to deliver water to the designated area. Where there is a shortage of water to serve the entire functional service area, a multiplier can be used to discount functional service area in accordance with water availability.

³ Irrigation supply includes only surface diversions and pumped groundwater, and irrigation demand includes crop evapo-transpiration, seepage, percolation, etc.

- % actual implementation of various aspects of maintenance [i.e., silt and weed removal (mechanical/manual), dredging-trash removal (mechanical/manual), rip rap, banks, bridge and gates maintenance, mechanical/manual drainage maintenance, pitching, main/booster pump stations and GW wells] toward targeted maintenance works,
- (Canal/drain/well) Flow Capacity = Actual flow capacity / Design flow capacity,
- Efficiency and effectiveness of O&M practices.
- Maintenance Resource Utilization Index = Volume of work / Funds expended,
- Structural Functionality = Number of functional structures (canals, drains, wells, pumps) / Total number of structures,

How productively are land and water being used?

- Output per cropped area = SGVP / Irrigated cropped area
- Output per unit command = SGVP / Command area
- Output per unit irrigation supply = SGVP / Diverted irrigation supply
- Output per unit water consumed = SGVP / Volume of water consumed by ET

Where, SGVP = Standardized Gross Value of Production

$$= [\sum A_i Y_i (P_i / P_b)] * P_{world}$$

in which, A_i is the area cropped with crop i
 Y_i is the yield of crop i
 P_i is the local price of crop i
 P_b is the local price of the base crop (the predominant locally-grown, internationally-traded crop)
 P_{world} is the value of the base crop traded at world prices

2.6.3 Impact Indicators

What has been the effect of IMT on overall water use and irrigation & drainage infrastructure (including groundwater wells and pumping stations)?

- Changes (increase/decrease) in conjunctive use of water
- Increase of groundwater resources utilization
- Increase of life expectancy of irrigation & drainage systems, groundwater wells and irrigation and drainage pumping stations
- Reduction in overall water use (should be measured in head and tail areas and for different farm size categories)

What has been the effect of the transfer program on the environment?

- Measured improvement in water quality
- Irrigated Area Sustainability Index = Current irrigable area / Initial irrigable area

- Reduction in using polluted water in irrigation
- Reduction in water related diseases
- Resource Degradation Index = % of potential irrigation service area lost due to environmental problems (including waterlogging, salinity, sodicity, erosion, depletion of soil fertility, siltation of canals, etc.)

2.7 Indicators on Changes in Costs of Irrigation/Drainage System Maintenance

2.7.1 Process Indicators

- Adequacy of resources mobilized for irrigation and drainage schemes maintenance
- Diversification of farmers revenue sources for maintenance
- Financial requirements of preventive maintenance
- Financial requirements of urgent remedial maintenance
- Gap between existing and desired levels of financing for maintenance
- Maintenance budgeted costs & revenues and actual expenses & revenues
- Maintenance costs of irrigation and drainage schemes for both government and farmers

2.7.2 Outcome Indicators

What has happened to cost recovery collection rates since the IMT program was implemented? How adequate are farmers' generated financial resources for irrigation and drainage schemes maintenance requirements?

- % Reduction/increase in annual government/farmers expenditures for maintenance
- Cost recovery Collection Rate of irrigation and drainage maintenance service fee = $\text{Amount of funds collected} / \text{Amount of funds assessed for maintenance}$
- Farmers Financial Self Reliance Index = $\text{Amount of funds and other contributions for irrigation/drainage maintenance from farmers} / \text{total resource requirement for maintenance}$
- Maintenance Financial Viability Index (MFVI) = $\text{Revenue available from maintenance service fees} / \text{total cost of maintenance}$
- Maintenance Resource Sufficiency Index = $\text{Amount of funds allocated for maintenance} / \text{Funds required for routine preventive maintenance} + \text{funds required to repair backlog of deferred maintenance}$
- Water User Payment Rate = $\text{Number of water users who paid cost recovery in full} / \text{Total number of water users required to pay}$

2.7.3 Impact Indicators

- Financial sustainability of infrastructure maintenance
- Increase of water users expenditures for maintenance of irrigation and drainage schemes
- Local financial self-sufficiency for I&D system maintenance budget

- Reduction in expenditures by government on maintenance of irrigation and drainage schemes,

2.8 Indicators for Costs of Irrigation/Drainage System Operations (Including Fee Structuring and Financial Viability of Privatization)

2.8.1 Process Indicators

- Capacity of farmers to ensure the financial and physical sustainability of scheme infrastructure
- Cost of constructing irrigation & drainage systems, GW wells and Irrigation and drainage pumping stations,
- Gap between existing and desired levels of financing for operation,
- Operation budgeted costs & revenues and actual expenses & revenues.

2.8.2 Outcome Indicators

- % annual increase/decrease of operation costs for both government and farmers
- Farmers Financial Self Reliance Index = Amount of funds and other contributions for irrigation/drainage systems operation from farmers / total resource requirement for operation
- Operation Financial Viability Index (OFVI) = Revenue available from irrigation operation services fees / total cost of operation
- Ratio of cost of irrigation to gross value of agricultural output
- Reduction in government subsidies for operation of irrigation and drainage schemes
- Size of I&D Directorates budget for establishment and operational budgets at scheme and district levels, before and after reforms (not including rehabilitation program funds)

2.8.3 Impact Indicators

- Financial sustainability of infrastructure operation
- Increase of water users expenditures for operation of irrigation and drainage schemes
- Local financial self-sufficiency for I&D system operation budget
- Reduction in expenditures by government on operation of irrigation and drainage schemes

2.9 Water Utilization / Water Saving Indicators

There are several criteria for assessing the performance of water utilization. The most common ones are efficiency, reliability, adequacy and equity. The most common measures of efficiency are:

- Ratio of crop water requirement to water delivered to field.
- Ratio of actual area irrigated to target area irrigated (change in irrigated area).

Reliability of water delivery can be measured by such indicators as:

- Actual water volume in field / target water volume (water availability)
- Number of target irrigation turns delivered
- Percentage of farmers confident they will receive water when they need it

Adequacy of water delivery can be measured by such indicators as:

- Ratio of actual water delivered to target water delivery
- Relative water supply =
$$\frac{\text{Irrigation Water}}{\text{Evapo-transpiration} + \text{Seepage} + \text{Percolation}}$$
- Adequacy of water distribution (measured at head, middle and tail reaches)
- Decrease in agricultural drainage reuse (especially at the tail ends of mesqas)
- Decrease in shallow groundwater use (especially at the tail ends of mesqas)

Equity can be measured by such indicator as the following:

- Number of complaints about water availability at head, middle and tail ends of canals.

In terms of categorizing these features according to process, outcome and impact:

2.9.1 Process Indicators

- Volume of water supplied
- Increased night irrigation

2.9.2 Outcome Indicators

- Average number of irrigations
- Decrease in agricultural water reuse (especially at tail ends of mesqas)
- Decrease in shallow groundwater use (especially at tail ends of mesqas)

2.9.3 Impact Indicators

- Number of complaints about water availability at head, middle and tail ends of canals
- Adequacy of water distribution (measured at head, middle & tail reaches)
- Change in irrigated area
- Efficiency of water distribution (or reduction in water wastage)
- Changes in irrigated cropping intensity

2.10 Rural Economic Indicators

Economic productivity of irrigated agriculture is normally a function of agricultural output and crop prices. But it has broader relevance to rural income, employment and poverty reduction. Potential *output and impact indicators* of economic productivity of IMT are:

- Annual cropping intensity, measured as proportion of area cultivated to total cultivable area, added for each season in a year
- Crop yield per unit of water
- Crop yield, measured as crop output in kgs or metric tons per feddan
- Land profitability, measured by gross value of output per unit of land
- Number of crops grown per year for a given irrigated area
- Water profitability, measured by gross value of output per unit of water

2.11 Industrial Economic Indicator

- Industrial revenue sources for the BCWUA (e.g., an annual fee for discharging industrially treated liquid waste materials into drains), by industries holding a legitimate license for discharge effluents into waterways (cf. Article 82 of Law 48/1982)

2.12 Environmental Indicators (Including Water Quality)

In some cases IMT may be expected to change the way irrigation systems affect the environment. For example, improved water distribution can reduce the need for tail-end farmers to pump recycled saline water from drains or shallow aquifers. It can also increase the amount of freshwater available for flushing salts out of soils. The following are examples of potential indicators of environmental sustainability of irrigation.

2.12.1 Process Indicators

- Fertilizer application rates
- Pesticide application rates
- Rates of pollution charges and fines by adopting the principle of “Polluter Pays”
- Rates of concentration of effluents, such as industrial water, herbicides, solid waste and other toxic substances

2.12.2 Outcome Indicators

- Irrigated area lost to production due to salinity of soil
- Irrigated area lost to production due to water logging of land
- Salinity and sodicity of soils and water
- Rate of siltation in land and in canals
- Incidence of water-related diseases
- Changes in level of aquatic weed control and abatement

2.12.3 Impact Indicators

- Resource degradation index, measured as percentage of service area lost due to resource degradation
- Sustainability of irrigated area, measured as ratio of irrigable area to initial irrigable area
- Levels of untreated wastewater release to water resources and management system

The indicators, information/data collection methods, and analyses all should be designed to correspond as far as possible with the standard package of the MWRI National Water Quality Monitoring program (NWQM) of the Irrigation and Drainage Departments.

2.13 Organizational/Institutional Management Indicators

2.13.1 Process Indicators

- Number of BCWUA organizing meetings held
- Number of BCWUAs leaders who received training
- Number of BCWUAs which received special agriculture extension training
- Percentage of BCWUA members in different land tenure categories
- Number of BCWUAs which had contested elections
- Percentage of BCWUA members who participate in BCWUA elections
- Number of BCWUA's which have opened bank accounts
- Number of BCWUA's with O&M plans
- Percentage of potential BCWUA members from tail end vs. head end who have become members
- Measures taken by BCWUAs to improve efficiency of O&M procedures

2.13.2 Outcome Indicators

- Percentage of cost of rehabilitation borne by farmers
- Percentage of WUAs which reviewed and approved construction designs
- Percentage of WUAs which participated in construction
- Proportion of proposals by farmers implemented by MWRI
- Cost of rehabilitation per feddan

2.13.3 Impact Indicators

- BCWUA social support index, measured as a percentage of BCWUA members who support BCWUA leaders
- BCWUA member stability index, measured as % of BCWUA members who have long-term rights to irrigated land
- Percentage of BCWUA leaders who are women

- Share of funds raised by BCWUA's from sources other than water charge
- Organizational responsiveness, measured as ratio of number of functions performed to number of functions required

2.14 Operations and Management Responsibility Performance Indicators

The following are examples of some specific indicators in this category:

2.14.1 Process Indicators

- Amount of required O&M work plan which is funded by MWRI
- BCWUA stakeholder fee collection rate
- Extent to which democratic processes are used in WUA formation (inclusion of tail enders, women, etc.)
- Percentage of irrigation expenditure on a scheme paid by BCWUAs

2.14.2 Outcome Indicators

- Number of BCWUAs which have had responsibility for water delivery transferred to them at a specified level, (or which have taken over the water delivery function)
- Number of BCWUAs which have had responsibility for canal maintenance transferred to them at a specified level (or which have actually taken over the maintenance function)
- Number of BCWUAs which have had responsibility for partial or complete financing of O&M transferred to them at a specified level (or which have actually taken over this function)
- Number of revenue sources for BCWUA for irrigation O&M
- Ratio of total revenue for O&M to total cost of O&M
- Ratio of level of expenditure for O&M to volume of deferred maintenance yet to be done

2.14.3 Impact Indicators

- Ratio of amount of fees collected from users to total cost of irrigation O&M
- Farmer awareness about benefits, costs and risks IMT would provide
- Farmer awareness about new rights, functions and responsibilities for farmers, due to IMT
- Farmer awareness about expectations and intention of government for IMT

2.15 Capacity-Building Indicators

This critical arena includes training and capacity support to both MWRI staff and BCWUA members, and may be measured by selecting among the following indicators:

2.15.1 Process Indicators

- Number of training events for staff
- Number of staff transferred from O&M to other new functions
- Number of staff assigned to technical auditing and consultation
- Number of government officers trained in IMT principles and methods
- Number of farmers qualified with necessary skills to implement PIM

2.15.2 Outcome Indicator

- Percentage of farmers who believe that communication between WUA and the irrigation agency is adequate and effective

2.15.3 Impact Indicators

- Technical capacity index, measured as percentage of staff with required skills for their position
- Service delivery responsiveness, measured as ratio of number of services delivered to number of services required

2.16 Social Change Impact Indicators

There are many possible ways to measure social change impact among BCWUAs. Among these are:

- Levels of off-farm employment and other income sources
- Knowledge and awareness of water-related issues (cf. 1998 and 2001 KAP Studies)
- Conflict Resolution:
 - a) No. of complaints lodged with MWRI agencies;
 - b) No. of problems or conflicts solved locally
- Participation of women in water management
- Changes in presence or decline of water related diseases
- Changes in cooperative management and decision-making:
 - a) No. of regular BCWUA meetings
 - b) Meetings regularly held or not
 - c) Level of farmer contribution to water activities (e.g. money, labor or in-kind contributions)
- Rotation scheduling agreed and being applied among BCWUA shareholders
- Incidence of illegal use of water by farmers
- Efficient time use for irrigation / drainage and perceivable time savings
- Irrigation employment generation, measured by annual labor days per feddan
- Irrigation wage generation, measured by average annual income per feddan
- Increase/decrease in seasonal out-migration from irrigated areas

3 IMT M&E: Data Gathering, Analysis and Reporting

The Irrigation Advisory Service staff (IAS) will be the MWRI focal point for conducting and implementing the M&E effort with support from other MWRI line departments, and the National Water Research Centre. The primary stakeholders concerned will be: MWRI central authorities, district units, water users, and policy-makers / planners. Stakeholders' priorities should be discussed and ranked in workshops or small meetings in order to generate only the data that are needed.

The IAS should not select too many indicators or try to collect more data than can be managed and presented efficiently. They should estimate the total amount of information that can realistically be utilized by those who receive it. The information requirements agreed upon in advance will be presented to concerned stakeholders in appropriate formats (e.g. charts, graphs, tables, statistics, oral reports or brief written descriptions, etc. depending on the category of stakeholder and level of interest.)

Regarding frequency of monitoring activities: it should be understood that MES tasks should be keyed to critical intervals in the agricultural production cycle, as well as to the schedule of physical O&M works. When developing an M&E plan, an implementation task schedule (timeline) needs to be prepared in order that all stakeholders are adequately prepared as the tasks are undertaken. Scheduling of MES tasks must take into account the cropping pattern and seasons.

3.1 Process of Selecting the M&E Indicators

Based on priority informational requirements and staff availability/skills/finances, and capacity of decision makers & other stakeholders, priority quantitative and qualitative indicators, will be carefully selected with consideration given to validation, simplicity and general applicability. Indicators in general are derived from the overall objective of the IMT and from the performance criteria. Indicator-based instruments would need to be pre-tested before the system is finalized.

3.2 Methods for Data Collection and Analysis

The four general steps for carrying out data collection and analysis are:

3.2.1 Sampling

Careful and deliberate sampling is needed for selection of data from certain places, units or people to gain acquaintance about the extent of possible data to be collected with confidence and the direct impact of IMT program. Generally, there are several cogent reasons to use a careful sampling process. The first reason is that it will be expensive to collect data from all individuals on a BCUWA; the second reason is it enables the IAS to state with confidence that the data collected tells the reader not only about the canal section or individuals from whom we collected the data but about the entire canal or the entire set of persons in a given unit or area. In other words, it enables us to generalize over a larger class of things or people.

3.2.2 Data Collection

The method of gathering data from the field will include:

- Interviewing of randomly or selected individuals through well designed questionnaires, or focus groups or community interviews.
- Field appraisals through irrigation systems inspections and documentation, or group challenges with local people.
- Data collection instruments and questionnaires should be well designed. Pre-testing for data collection with few respondents or pilot location will serve for making any corrections and improvements.
- Use of Participatory Rural Appraisal techniques for maximum stakeholder involvement, and to assure veracity and complementarity of questionnaire data.

3.2.3 Data Analysis

- Data should transfer from original questionnaire or worksheet into data summary sheet or, preferably, computer file.
- Data collected will be better recorded in numbers (numeral codes).
- Data could be entered into computer software spreadsheets using a database or statistical package program.
- Data is aggregated when it is summarized or combined at higher levels.

The IAS M&E teams may use a spreadsheet program such as Excel, which has features to facilitate data entry and checking functions. Database programs, such as SPSS, Access and dBase, work well for large and complex databases, especially where relational databases are to be developed. They also provide the most options for how data can be presented. However, some applications require custom-made programming and there are fewer people who are familiar with database programs. Statistical package programs, such as SPSS or StatPro, provide considerable ease between data entry, checking, tabulation, and application of sophisticated statistical analyses. For most monitoring purposes spreadsheets may be the most practical option for data entry. Data can later be exported into programs such as PowerPoint for presentation in meetings to the MWRI IMT Steering Committee or to donors.

3.3 Presenting M&E Results

Presenting the results of M&E should be flexible and dynamic depending on the category of stakeholder (senior officials, middle staff, BCWUA representative, etc.) Graphs, charts, tables or short text should be emphasized as these are appreciated by most MWRI officials. Results may be presented in seminars or workshops, where valuable responses or interactions should be recorded. Presentation of results should be carried out in such a way so as to generate useable knowledge for decision-making and/or adjustments to help achieving the IMT program and policy objectives. Findings and results of the M&E will be needed for planning,

implementation, outcomes and impacts presenting and utilizing the M&E results is the ultimate requirement of organizing and implementing the M&E. The Steering Committee should consider the best way of presenting the results to the different categories of stakeholders and advise the IAS management accordingly. For senior MWRI officials, administrators or politicians, a short summary (about one page) illustrated with a few charts or tables will be most effective to get the message across. For middle level MWRI staff, BCWUAs, and other private sector entities, seminars or workshops could be effective for communicating the findings, as these forums will generate the response and interaction among stakeholders. It will be worthwhile for the IAS teams to record the reactions and responses of the stakeholders during the presentation of the M&E findings, to assess their perspectives and perceptions in advancing or improving the process of the M&E and for future IMT policy and planning decisions.

3.4 Using Results of M&E

The results and responses generated from M&E should be targeted towards helping the concerned stakeholders to understand the nature of the process, outcomes and impacts that will give them the skills to support problem solving and capacity building. Therefore IAS should not consider M&E merely as a means to provide information, but also as a means to strengthen local management capacity, enhance skills and support problem solving.

Findings from M&E should be utilized in adjustments or modification of policies and plans to ensure IMT sustainability and success. M&E results should be used to help decision-makers figure out the extent, level, and scale of system transferring or privatization (branch canal, main canal, district level) and that changes made are compatible with the basic principles of IMT. M&E results may invoke timely changes that help achieve the outcomes and impacts that were considered in the IMT policy principles.

The MWRI Steering Committee should analyze and act on the above issues of utilizing the M&E results; this will lend considerable support needed for achieving the overall objectives of the IMT policy.

3.5 Methodological Tools for Gathering Information

Within the approaches of the basic types of monitoring and evaluation (M&E); the gathering of information and analyzing the sets of indicators selected for assessment and presenting the results, would consider the appropriate tools and mechanisms to achieve these tasks.

Based on guides and experience in such aspects, the process could be outlined in the following general scope. Sampling will be based on selection of certain data that would be collected from certain places, or people. Sampling will be needed to judge the extent and access for collecting credible data, and to generalize over the concept, and evaluate the effects. A baseline data about key indicators will be useful, wherever possible, to provide the basis for comparison.

It is recommended for the purpose of IMT tracking, to employ a **clustered sample process** in some ways replicating the head/middle/tail breakdown used to organize the BCWUA.

3.5.1 Data Collection

3.5.1.1 Interviewing

Interviewing may be carried out randomly and/or on selected individuals. Standard structured questionnaires will be required. For in-depth views and observations, knowledgeable individuals will be interviewed. Views should be shared by concerned type of stakeholders. If the time and staff of the M&E mandates were limited, it would be appropriate to hold focus group interviews, where flexible dialogue would be raised about issues that concern the subject and interviewer. For obtaining views of different stakeholders about different issues, mixed interviews may be appropriate to assess the interaction that occur between different types of stakeholders. Sometimes allowing different stakeholders to discuss issues freely together with intervention from the interviewer would be useful.

3.5.1.2 Field Appraisal

Field or site inspections are a common method for joint system appraisal. It's generally recommended for planning O&M, rehabilitation priorities, and conducting technical audits. Field inspections may be needed for the purpose of system documentation, cost estimates, identification of certain problems, implementation requirements, and outcomes/impacts. Field inspections and appraisals may be in the form of group dialogues with local stakeholders to spotlight certain problems. The Participatory Rural Appraisal (PRA) could be the target to assess the local knowledge, and perceptions, and help address the solutions. Simple forms with symbols could be designed for illiterate rural people for recording and collecting information. For the purpose of data collection, it's important to design data collection instruments. Questionnaires require complete standardization of questions, responses and coding of information into numeric categories. Worksheets or data record sheets may be used for recording secondary data from field observations. The simplicity of data collection instruments will reduce risk of errors in data transmission. For multiple interviews or extensive field inspections, it's better to have two data collectors, one for dynamics of interview, and the other for recording information. Data for different indicators, may have to be collected in different ways (interview, or field inspection, PRA, etc). Different indicators may need different times and frequencies of data collection. The IAS teams responsible for collecting the data should keep the method simple, and collect and use data for the most important and essential indicators. Pre-testing of data collection with a few trial respondents or in pilot sites can help make corrections and improvements before wide application. The pre-testing also helps to assess time, people and resources needed for the M&E program.

The total person/day could be calculated based on the pre-testing by using the formula;

$$\text{Person / day} = \frac{\text{No. Of questionnaires to be filled}}{\text{Av. No. Of questionnaires completed per day}}$$

3.5.1.3 Data Analysis

As soon as data is collected, it should be transferred into summary sheet or computer. This is to make it easier to find mistakes and make corrections while data collectors are still at the site and remembering the interviews and inspections. A small computer for data entry in the field would be advantageous. Quantitative data and even those recorded in categories (such as: yes/no – bad/good / excellent) should be recorded as numbers (Numeric Codes). This makes data checking, analysis and presentation easier. Once data collection has started codes should not be changed. Data files will be structured in rectangular form with columns representing different variables or indicators and rows representing different respondents and locations. Data files become relational when each file for certain unit or location (e.g. field canal) is linked by at least one variable to other similar types of units or locations, or other levels (other field channel) or other branch canal along the water basin. M&E organizers have the choice of entering data into computer software spreadsheet, database or statistical package program. Generally spreadsheets are better for relatively small and uncomplicated databases. Programs such as Excel are widely known and are easy for data entry and checking functions. M&E organizers should consider the importance of checking data error very soon after they have been filled in. Also, data files on computer should be checked for errors (for outlying values). Indicators with quantitative values, with or without comparisons can be evaluated by cross-tabulation tables, graphs and different kinds of charts. Indicators of outcomes and impacts are often structured in ratios to reflect input / output relationships. Data is always aggregated when it's summarized and combined at high levels (for village to district to province). Presenting the findings at certain levels to those stakeholders who had been involved in the M&E process make them feel as part of the process and own the results and increase the transparency and credibility.

3.5.1.4 Intensive Monitoring for IMT Pilot Areas

As stated earlier in this document, M&E efforts need to be confined to the most essential elements in order to minimize excessive resource allocation. An exception to this rule, however, is justified in the case of a pilot effort, where the M&E data will be critical to planning for launching the expanded IMT programs. It may be necessary where there is much uncertainty about how to proceed or much resistance to adopt the reform policy, to provide pilot scale demonstrations of the feasibility, or learn what are the best practices to implement the program or to support the major reform to evolve. The pilot interventions can provide opportunity for developing an efficient M&E system during the pilot stage (e.g. the IMT Four Pilot Areas). The implementation and outcomes of such pilot exercise can be studied in detail to refine the M&E data collection and analysis procedures.

4 IMT M&E Staffing & Resource Configuration

Staffing configuration needs for implementing the IMT M&E process will be phased and developed over time. The following section illustrates an indicative timeframe and resource needs allocation process.

4.1 Phase I

This phase will cover the joint management program needed to implement:

1. System essential needs of rehabilitation and maintenance.
2. Training and capacity building.
3. Fine-tune the roles and responsibilities.
4. Administrative and regulatory aspects.
5. Transfer the O&M to the WUAs.

Time span for this phase will be one to two years depending on local exigencies, constraints, and BCWUA capacities. During this phase, according to the MWRI ministerial decree, IAS will provide general organizational and management training support to the fledging BCWUAs. At the same time, the physical system rehabilitation will commence. Following successful completion of the physical upgrading, and confirmation that the BCWUA is on the track toward institutional capability, the second phase of IMT will be introduced.

4.2 Phase II

This second phase of IMT will test the abilities and capabilities of farmers to handle the operations and maintenance functions efficiently and properly. This period will allow for an assessment of procedural constraints. It will be critical during this phase for the IAS to offer technical backstopping and regular close monitoring, particularly with regard to cooperation and technical/managers support and advice will be provided. Facilities needed for the WUA would be available according to needs and priorities. Financial resources and funds generation will be initiated during this phase and will take about two years time.

4.3 Phase III

The third phase will focus on issues of institutional sustainability and impact assessment. This will comprise monitoring and evaluation of the capacities of the BCWUA from the managerial,

financial and technical proficiency so as to effectively carry out the mandate. This necessitates continuous and long-term regular monitoring of objectives.

4.4 Staffing Requirements for Each Pilot Area

4.4.1 Phase I Staffing Requirements

(all based on one-third time LOE for each position)

- ❑ One civil engineer
- ❑ One socio-economic specialist
- ❑ One field technician

The study team proposes that the above persons would be engaged in the pilot area on a one-third work time basis. These persons would be provided through the relevant MWRI permanent staff of irrigation, NWRC, EPADP, and Mechanical & Electrical Department. Final selection and personnel identification will be recommended to the MWRI Minister by the members of the IMT Steering Committee in consultation with the IAS.

4.4.2 Phase II Staffing Requirements

(all based on one-third time LOE for each position)

- ❑ One civil engineer
- ❑ One agronomist
- ❑ One socio-economic specialist
- ❑ One field technician

As in Phase I, staff would be engaged from among existing MWRI staff, on a similar one-third time basis.

4.4.3 Phase III Staffing Requirements

(all based on one-third time LOE for each position)

- ❑ One computer programming specialist
- ❑ One data entry and analysis specialist
- ❑ One civil engineer
- ❑ One agronomist
- ❑ One socio-economic specialist
- ❑ One technician

Consideration may be given to rationalizing the part-time personnel effort, so that the staff is assigned full-time to cover the three pilot areas in the Nile Delta. The staff should have administrative support in the form of a secretary and driver. At this stage (pilot stage of four areas) the IAS department would manage and secure the staffing and supporting staff in coordination with other Ministry field agencies.

4.4.4 MWRI Resources Required for IMT/Privatization M&E System

- Data storage facilities
- Data processing equipment (computers, office machines)
- Staff capacity building
- Reproduction facilities and equipment

5 M&E Training Needs for MWRI Staff and BCWUAs

The staff entrusted for M&E of the IMT at the different stages of the pilot areas and long-term policy implementation should be well trained to gain the skills and capacity to perform the job according to accepted standards.

The staff should be trained in the following general areas and technical skills:

1. The concept of IMT – objectives, processes, activities, outcomes, impacts and other related policies and programs.
2. Methods of sampling and systematic selection of data required from places, units, & people to assess the process of IMT through data collected from sample locations under the IMT program.
3. Data collection, interviewing, focus group methods, community interviews, or field appraisals. In this respect staff need to be trained on how to design data collection instruments, standard/formal questionnaire, methods to accurately record responses, code information in numeric categories, prepare data record sheet design, and denote field observations.
4. Data pre-testing techniques for trial surveys among respondents in pilot locations in order to fine-tune or improve the data collection instruments.
5. Training for data analysis and its requirements and tools. These include data files structures, entering data into computer software spreadsheet or database; checking data for errors, and the aggregation of data at the higher level.
6. Training for presenting and using the M&I results are of great importance for taking decisions. In this respect, different ways of presenting the results to different stakeholders and decision makers will be considered e.g. reports, charts, seminar, oral presentations, etc.
7. Methods of Participatory Rural Appraisal techniques.

At this pilot stage, the IMT M&E staff members are the primary target for the training, along with BCWUA members will be involved in the effort.

6 Indicative Budgetary Requirements for Monitoring & Evaluation

Upon initiation and implementation of the M&E program (Phase I) MWRI will need to make available the budget required for staff salaries, allowances, training costs, and equipments/materials/logistics.

6.1 Staff Salaries and Allowances

Based on 5 permanent staff member and 3 supporting staff

1. Salaries	LE 80,000
2. Project Incentives	LE 40,000
3. Field Allowances	LE 32,000
Total	LE 152,000

6.2 Training Requirements

6.2.1 For MWRI/M&E Staff

Five courses for 10 days

1. Trainee per diem	LE 6,000
2. Instructor Allowances	LE 4,000
3. Logistics	LE 10,000
4. Other	LE 5,000

Total	LE 25,000
--------------	------------------

6.2.2 For BCWUA Members

32 members (from 4 pilot BCWUAs)

5-day course

1. Board Members per diem	LE 8,000
2. Instructors	LE 3,000
3. Logistics	LE 8,000
4. Others	LE 4,000

Total	LE 23,000
--------------	------------------

6.2.3 Basic Equipment / Transport / Materials

• Office Furniture	LE 10,000
• Office Equipment	LE 15,000
• Transportation	LE 100,000
• Materials	LE 5,000
• Contingencies	LE 3,000

LE 133,000